J|A|C|S
BOOK REVIEWS

Circular Dichroism: Principles and Applications. Second Edition. Edited by Nina Berova (Columbia University), Koji Nakanishi (Columbia University), and Robert W. Woody (Colorado State University). Wiley-VCH: New York. 2000. xxii + 878 pp. $195.00. ISBN: 0-471-33003-5.

Chiral molecules are "optically active", that is, they exhibit the optical phenomena of optical rotation (OR) and circular dichroism (CD). OR and CD are routinely used to characterize the stereochemistries of chiral molecules, especially their absolute configurations and conformational structures. Since the 1960s, when the measurement of CD was revolutionized by modulation spectroscopy techniques, CD has been the phenomenon of choice for stereochemists. Despite the importance of CD spectroscopy, however, remarkably few books devoted to this subject have been published. The publication in 1994 of the first edition of this book was, therefore, a significant event. This second edition has been substantially updated and enlarged and gives a comprehensive overview of the field of CD spectroscopy at the beginning of the 21st century.

There are 29 chapters in this book. After an introduction by the late Günther Snatzke and an elegant essay on the history of theories of the origin of molecular chirality by Mason, the theory and calculation of CD are surveyed by Koslowski, Sreerama, and Woody. Both quantum-mechanical (ab initio and semiempirical) and classical methods for calculating rotational strengths, which determine CD intensities, are discussed. The applications of semiempirical calculational techniques are further developed in subsequent chapters by Sandström and Harada, and in another chapter, Berova and Nakanishi review the exciton coupling calculational method. A number of chapters focus on the CD of specific chromophores: Lightner reviews the octant rule for carbonyl n $\rightarrow \pi^*$ transitions, and Gawronski and Smith discuss the diene and benzene chromophores, respectively. The CD of biopolymers is discussed in several chapters: Sreerama and Woody discuss peptides and proteins; Johnson and Maurizot separately discuss nucleic acids; Ardhammer, Kurucsev, and Norden discuss DNA−drug interactions; and Gray discusses protein−nucleic acid interactions. In addition, there are chapters by Green and by Yashima and Okamoto on the CD of abiological polymers as well as a chapter by Gottarelli and Spada on CD in cholesteric mesophases. The CD of inorganic complexes is reviewed by Kuroda and Saito.

A number of chapters are focused on techniques that are less widely used than conventional UV−vis CD spectroscopy. For example, Kuball and Höfer discuss the CD of oriented molecules; Kliger and Lewis discuss fast, time-resolved CD spectroscopy; Dekkers, Richardson, and Metcalf separately discuss the circularly polarized luminescence (CPL) of organic molecules and metal complexes; Kuroda writes about solid-state CD; and Salvadori, di Bari, and Pescitelli discuss HPLC-CD. Last, but not least, there are three chapters on vibrational optical activity: Nafie and Freedman discuss vibrational CD (VCD) and Raman optical activity (ROA), Keiderling discusses the application of VCD to the conformational analysis of peptides and proteins, and Barron and Hecht discuss ROA.

This excellent book provides the reader with a snapshot of contemporary research on CD and related topics. It should be of great value to a wide variety of chemists and biochemists.

Philip J. Stephens, *University of Southern California*

JA015338N

10.1021/ja015338n04/18/2002